ing accuracy and fullness of detail as to title, author, date, size, and place of publication. A short note of explanation or pertinent remark is in many cases added to the entries of the rare and little-known publications. Mr. Sherborn thus enumerates about 700 authors, with full title of book or memoir, carefully systematic abbreviation of titles of periodicals, and place of publication as given in the originals. Notices and general reviews having original information are included. Mr. Sherborn has examined all the works he has catalogued, with very few exceptions, and these are properly marked "not seen." The authors most prolific of memoirs are Brady, Carpenter, Carter, Dawson, De la Harpe, D'Orbigny, Ehrenberg, Folin, Fornasini, Gümbel, Haeusler, Hantken, Karrer, Jones, Munier-Chalmas, Neugeboren, Parker, Reuss, Robertson, Schlumberger, Schultze, Seguenza, Soldani, Stache, Terquem, Terrigi, Uhlig, Van den Broeck, Wallich, and Williamson. Former lists have evidently been carefully collated and corrected: and the life-dates (birth and death) of deceased authors have been entered as far as possible.

Several of the older papers are now catalogued for the first time, such as "Camerarius's papers, 1712 and 1717; Klein's, 1754; Schroeter's, 1803; and Wulfen's, 1791"; we also find "the correction of the hitherto inaccurate references to Spengler's papers; the original place of publication of Modeer's letter to Soldani; and Ricca's 'Discorso,' with the engraved portrait of Soldani"; and, "among those of scientific importance, ... the earlier issue of Fichtel and Moll (which carries back their scientific names five years); D'Orbigny's list of the Foraminifera of the Vienna Basin, published by J. von Hauer seven years before the full description appeared; the note on D'Orbigny's 'Planches inédites'; Boué's paper on the Nummulites; and Silvestri's rare and interesting paper on Soldani's 'Testaceographia.' For the first time, too, an endeavour has been made to enumerate the important memoirs published by the Hungarian authors with some approach to completeness."

The whole work has been conscientiously done, with scrupulous exactness; and the industrious author has made it a labour of love for several years, since he began to study Foraminifera. Having so full a knowledge of the subject, he might with advantage, we venture to think, give further aid to students and others by publishing an index and synonymy of all the recorded genera and species of Foraminifera.

In the preface to the bibliography, Mr. Sherborn fully acknowledges the help he has received from his many friends at home and abroad; and he refers to such analogous and collateral bibliographies as have been aids in his research. This work will without doubt be fully appreciated by biologist and palæontologist; and we cordially agree with the author in his remark that "sincere thanks are due to Mr. F. Justen (Dulau and Co.), to whose generosity and scientific sympathies I owe the publication of my manuscript."

T. R. J.

Earth Knowledge. Part II. By W. J. Harrison, F.G.S., and H. R. Wakefield. (London: Blackie and Son, 1888.)

THIS book, in conjunction with the companion volume issued a few months ago, is chiefly intended for the use of students preparing for the Science and Art Department's examinations in Physiography. The book is far too small for its subject, and in consequence, only very bare outlines of the different branches of the subject can be given, and much is omitted which we should expect to find. It is scarcely possible, for instance, to give an adequate amount of information about the sun in half a dozen small pages; yet the authors have attempted to do this, and the result is what might be expected—namely, a very scanty chapter. No mention is made of the fact that the corona is of variable form, and since only one drawing is given, a student would be likely to infer that its form is constant. Again, the possibility of observing prominences whenever the sun is visible, and the peculiarities and variability of sun-spot spectra are not touched upon at all. No chapter on the sun can be regarded as complete which does not treat of the various solar phenomena in relation to the sun-spot period.

Again, the classification of stars according to their spectra (p. 78) is not treated nearly so fully as its importance demands. Notwithstanding the fact that there are two distinct kinds of red stars, one giving indications of metallic fluting absorption, and the other of carbon absorption, we are simply told that in the red stars the lines are more numerous than in stars like Arcturus (p. 79).

On p. 126 we read:—"Although the sun's mass is so very much greater than that of the moon—being nearly sixty million times as great—yet the tide-producing force of the sun is only about seven-sixteenths that of the moon, because the sun is nearly 400 times farther off the earth than the moon." Although this statement is quite true, a little further explanation is necessary to make it consistent with the arithmetical fact that sixty millions is greater than the square of 400. It is only fair to say, however, that the importance of considering the differential attractions of the sun and moon on opposite sides of the earth, instead of the total attractions, is well brought out with regard to the precession of the equinoxes.

On the whole, the drawings are excellent, but that on p. 29, showing the action of the spectroscope, is rather misleading; we would remind the authors that the slit is usually placed in the principal focus of the collimating lens, and that there is nothing to converge the rays of light to a point inside the tube.

Without the aid of a well-informed teacher, the book is far from sufficient to fulfil the purpose for which it has been written.

An Introduction to the Science and Practice of Photography. By Chapman Jones, F.I.C., F.C.S. (London: Iliffe and Son, 1888.)

WE have here quite a new departure from the ordinary books on photography, the subject being treated not from the mechanical but from the scientific point of view, and the author has succeeded in placing before us a very useful work.

The volume is divided into three parts. The first consists of fifteen chapters, the more important among them treating of the transmission and intensity of light, reflection by plane and concave mirrors, refraction of light and the forms and properties of lenses, &c., concluding with a chapter on the spectroscope, colour-sensitiveness, and the absorption of light. In Part II. are described various forms of cameras, camera-stands, exposure-shutters, followed by some very interesting chapters on the history and special properties of the many and various forms of lenses. Part III. consists of twenty-four chapters extending over 100 pages, in which are described the manufacture of collodion and gelatino-bromide plates, and all the different modes of developing, printing, toning, &c., including carbon-printing, Woodburytype, and other photo-mechanical processes.

In the appendix are tables of English weights and measures, and a comparison of them with the metrical system, preceded by an explanation of the methods of testing lenses. The volume is well illustrated, and the varied information contained in it ought to give it a wide circulation.

Numerical Examples in Practical Mechanics and Machine Design. By Robert G. Blaine, M.E. (London: Cassell and Co., Limited, 1888).

IN this volume there is an excellent collection of examples, the teaching power of which has already been

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tried by students attending the lectures at the Finsbury Technical College, who, as is stated in the preface, written by Prof. John Perry, have worked through them and obtained "a real good working knowledge of the application of the principles of mechanics and machine design; . . . their knowledge was always ready for use."

The examples, as a rule, are thoroughly practical, and may be taken as illustrating Prof. J. Perry's book on "Practical Mechanics," and Prof. Unwin's book on "Machine Design."

To make the volume more complete, useful rules and constants, together with tables of sines, cosines, tangents, and cotangents, of angles from 1° to 45°, are added, concluding with a table of the squares, cubes, square roots, cube roots, and reciprocals of all numbers from 1 to 100, and of approximate fifth roots from 1 to 1000.

A Text-book of Physiology. By M. Foster, F.R.S· Fifth Edition. Part I. comprising Book I. (London: Macmillan and Co., 1888.)

THIS work was originally published in 1876, and it has become so widely known that we need not now do much more than note the appearance of the first instalment of a new edition. In this edition—the fifth—considerable changes and additions have been made. The changes, however, do not affect the character of the book; and Prof. Foster explains that the additions, with the exception of the histological paragraphs, are caused, not by any attempt to add new matter or to enlarge the general scope of the work, but by an effort to explain more fully and at greater length what seem to him to be the most fundamental and most important topics. He has introduced some histological statements, not with the view of in any way relieving the student from the necessity of studying distinct histological treatises, but in order to bring him to the physiological problem with the histological data fresh in his mind. Hence in dealing with the several histological points the author has confined himself to matters having a physiological bearing. This first part will be followed as soon as possible by the second and third parts.

The Analyst's Laboratory Companion. By Alfred E. Johnson. (London: J. and A. Churchill, 1888.)

DURING the past four years, Mr. Johnson has had in every-day use in the laboratory a manuscript book of factors and tables. The work grew by constant additions, made as required; and in the end, as he explains in the preface, it became complete enough to encourage him in the belief that it might prove useful to analysts generally. Accordingly he has issued the present little volume, and no doubt he is right in thinking that the large amount of labour involved in the calculation of the many original tables here published may be found to save much of the time otherwise required by the analyst in working out the results of analysis. For the convenience of students not well acquainted with logarithms, of which he has made free use, he has given an account of them, adding examples fully worked out and chosen so as to include and explain the difficulties generally felt in connection with this subject.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Prophetic Germs.

I REGRET to find that I put an erroneous interpretation upon the phrase "non-significant organs," as used by Prof. Ray Lankester. I never doubted that it meant organs or structures which were non-significant in respect to actual use; that, in short, it was his phrase for what other men have variously called aborted or rudimentary organs. He now explains that "non-significant," in his terminology, means any variation from hereditary forms which is fortuitous—as unknown in respect to its origin as it is in respect to its actual or future use. Although I see no value in this phrase as descriptive of anything that exists, I see great value in Prof. Ray Lankester's admission that natural selection cannot act upon any structure which is not already developed up to the stage of actual use. This is really all I want for my previous argument, because all organs whatever do actually pass through rudimentary stages in which actual use is impossible. In no possible case, therefore, can selection explain the origin of any organic structure. I rejoice to find Prof. Ray Lankester denouncing as "an absurdity" the idea that "congenital variations are selected when they are not of any actual use." It must therefore be quite according to the admitted constitution and course of Nature that we should find organs "on the rise," as well as organs "on the wane." All germs must be prophetic of their future use, so long as they are in germinal stages; and, if evolution be true, the world ought always to have been full of them, and ought to be full of them now, unless the creative or evolutionary work has been arrested, at least locally, and for a time. ARGYLL.

Inveraray, Argyllshire, October 8.

The Geometric Interpretation of Monge's Differential Equation to all Conics.

WITH reference to the remarks of "R. B. H." (NATURE, June 28, p. 197) on my interpretation of the differential equation to all conics, I wish to point out that the objections he seems to take do not appear to be well founded. The difficulty he finds is that the geometrical interpretation given amounts to the fact that "a conic is a conic." But it is easy to see that there is no peculiarity in this; it arises simply from the well-known fact that all the geometrical properties of any given figure are inter-dependent: one of them being given, the others may be deduced as legitimate consequences from it. "R. B. H." takes the proposition which constitutes my interpretation, and then, coupling it with the other theorem that the osculating conic of any conic is the given conic, comes to the conclusion that a conic is a conic, and, apparently, he takes it to be very strange; but, as a matter of fact, given *any two* properties of a conic (or of any other curve), we can only come to the conclusion that the conic is a conic (or that the given curve is what it professes to be). Take, for example, the geometric interpretation of the differential equation of all right lines, which is $q = 0$; it simply means that the curvature vanishes at every point of every right line, which is equivalent to the fact that a straight line is not curved, or that a straight line is a straight line. There is certainly nothing strange in this: it is the legitimate effect of the process employed. Would "R. B. H.," on this ground, reject the geometrical interpretation of the differential equation of all straight lines? Surely the process is nothing but a piece of quite unobjectionable verification. Similarly, the differential equation of all circles, $(1 + p^2)r - 3pq^2 = 0$, means that the angle of aberrancy vanishes at every point of every circle. Combining this with the self-evident proposition that the normal and the axis of aberrancy coincide in the case of a circle, we may come to the conclusion that a circle is a circle; but I submit that this is really a verification, and surely no ground for rejecting the interpretation. Indeed, the question whether such processes are to be regarded as verifications or not seems to me to be much the same question whether every syllogism is a *petitio principii* or not. But as I have elsewhere, in the papers referred to in my last letter (p. 173, *ante*), fully discussed what a geometrical interpretation properly ought to be, I need not enlarge further on this point.

As to the difficulty which "R. B. H." feels in drawing a curve at every point of which the radius of curvature vanishes, I may remark that this is a "limiting case," and the matter becomes clear when my interpretation is paraphrased thus: "If the radius of curvature of the aberrancy curve of a given curve vanishes at every point, that curve degenerates into a conic."

Finally, I fail to see why an interpretation is to be rejected simply because the property it enunciates happens to admit of an easy verification. The conic has an infinite number of properties, and the chief difficulty in discovering the geometrical interpretation of its differential equation has been to find out which

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